

Remarks

Responsive to the Office action mailed November 23, 2005, Applicants provide the remarks herein. Reexamination and allowance of the subject application is respectfully requested.

Rejections Under 35 USC §112

Claims 1-14 and 17 were rejected under 35 USC §112, first paragraph. Specifically, it was asserted that the definition of an alkane is a saturated acyclic hydrocarbon, and was therefore found to be confusing how an alkane molecule could include functional groups other than hydrocarbons. While Applicants respectfully submit that, consistent with common usage in the art, alkanethiol is understood to refer to a molecule having the formula $R(CH_2)_nSH$ even where R is another function group such as carboxyl, hydroxyl, etc., to facilitate prosecution, independent claims 1, 13, and 17 have been amended herein to replace the term “alkanethiol” with the term --thiol compound--. Applicants respectfully submit that this amended terminology is consistent with a molecule having the formula $R(CH_2)_nSH$ in which R may be a methyl, carboxyl, hydroxyl, formyl, amide, etc. Dependent claims 2, 3, 6, and 9 have been similarly amended. No new matter is believed entered by this amendment. Withdrawal of this rejection is respectfully requested in view of the amendments and remarks herein.

Claims 1-14 and 17 were further rejected under 35 USC §112, first paragraph, for the asserted reason that it is unclear what VS is in example 4, 11:25. Referring to paragraph [0006] of the application as published, VS is disclosed to be vinyl silane, which is known, e.g., from referenced U.S. 5,759,629, to have the general structure $CH_2CHSi(OC_2H_5)_3$. Accordingly, Applicants respectfully submit that VS as used in example 4, 11:25 is sufficiently described. Withdrawal of this rejection is respectfully requested.

Claims 4, 6-8, and 17 were rejected under 35 USC §112, second paragraph. Claim 4 is cancelled herein, rendering the rejection thereof moot.

Claim 6 was rejected because it was found to be unclear which step in claim 1 constituted the coating step, giving rise to the limitation “prior to coating” in claim 6.

Applicants respectfully submit that coating with thiol compound would readily be understood to refer to “treating said metal with said solution or dispersion” of the thiol compound in a solvent recited in claim 1. Consistent with this understanding, claim 6 has been amended to replace the term “coating” with the phrase --treating with-- as recited in claim 1. Accordingly, as amended claim 6 recites “said metal is galvanized, eltro-galvanized, phosphated, resin-coated, or combinations thereof prior to treating with said thiol compound.”

Claim 7 was rejected because it was believed that ethyl acetate and butyl acetate should be broken out into two separate species. Claim 7 has been amended herein to delete the phrase “ethyl or” from the recitation, as ethyl acetate is previously recited in claim 7.

Claim 8 was rejected because the term “preferred” was held to be indefinite. Claim 8 has been amended herein to delete the term “preferred”.

Finally, claim 17 was rejected because there was no antecedent basis for the term “the treated surface.” Claim 17 has been amended to replace “the treated surface” with --a coated surface of said steel --. As amended, the terms in claim 17 are now believed to have proper antecedent basis.

In view of the foregoing remarks and amendments, Applicants respectfully submit that all of the rejections under 35 USC §112 are overcome. Withdrawal of the rejections under 35 USC §112 are respectfully requested.

Claim Objection

Claims 1 and 13 were objected to because the term “it” lacks proper antecedent basis. As suggested by the Examiner, claims 1 and 13 have been amended to replace “it” with --said metal-- and --said steel-- respectively. Withdrawal of the objection to these claims is respectfully requested in view of the foregoing amendment.

Rejections Under 35 USC §102

Claims 1-6 and 13 were rejected Under 35 USC §102(b) as being anticipated by JP 10-001786.

Consistent with the translated abstracts, JP 10-001786 teaches a method of providing corrosion resistance to a galvanized steel sheet by first pre-treating the galvanized steel sheet to provide a chemical conversion coating that is achieved by applying a solution containing silicate esters and inorganic salts of aluminum. The solution applied to the surface of the galvanized steel sheet is heated and dried to provide the chemical conversion coating. After the chemical conversion coating has been applied, a “film is provided on the chemical conversion-treated film. The film consists of a mercaptide” compound. The mercaptide compound may be a reaction product of a thiol compound and the chemical conversion coating. Accordingly, it is the chemical conversion coating that is being treated with a thiol compound, and not the galvanized sheet steel.

By contrast to the teachings of JP 10-001786, independent claim 1 recites a “method for providing corrosion protection for a metal by coating said metal with a thiol compound.” (Emphasis added) In part, the method requires “treating said metal with said solution or dispersion.” (Emphasis added) Similarly, independent claim 13 recites a “method of providing corrosion protection for a galvanized steel by coating said steel with a thiol compound.” (Emphasis added). Similar to claim 1, claim 13 requires, in part, “treating said galvanized steel with said solution or dispersion.” (Emphasis added) Accordingly, in each of claims 1 and 13, the metal or the steel is treated with a thiol compound.

In summary, JP 10-001786 teaches first applying a chemical conversion coating on a galvanized steel sheet using a solution of silicate esters and inorganic salts of aluminum. A film including a mercaptide compound is then provided on the chemical conversion coating. As such, JP 10-001786 does not teach treating a metal or galvanized steel with a thiol compound, as required by independent claims 1 and 13. Rather, JP 10-001786 teaches reacting a chemical conversion coating with a thiol compound to form a mercaptide compound. Withdrawal of this rejection is respectfully requested in view of the foregoing remarks.

Claims 1-4, 7-8 and 10-11 were rejected under 35 USC §102(b) as being anticipated by JP 57-198269.

Independent claim 1 has been amended to recite the metal being coated as being “selected from the group consisting of hot rolled and pickled steel sheet, cold-rolled steel sheet, hot-dipped metallic coated steel sheets, electroplated metallic coated steel sheets, aluminum sheets, aluminum alloy sheets, zinc sheets, zinc alloy sheets, and gold.” Support for these metals can be found, e.g., in claim 4, which is cancelled in consideration of this amendment.

By contrast to the claimed invention of independent claim 1, JP 57-198269 teaches a method of providing corrosion prevention for silver plated stainless steel. The English language translation of the abstract does not teach or suggest any applicability of the disclosed method beyond narrowly disclosed application of silver plated stainless steel. As independent claim 1, upon which claims 2-3, 7-8, and 10-11 ultimately depend, is directed to metals other than silver plated stainless steel, it is respectfully submitted that JP 57-198269 does not teach, or even suggest, the invention of claims 1-3, 7-8, and 10-11. Withdrawal of this rejection upon consideration of the amendments and remarks herein is respectfully requested.

Claims 1-2, 4, and 7-11 were rejected under 35 USC §102(b) over Scherer et al. (Langmuir 13, pp 7045-7051).

As indicated above, independent claim 1 has been amended to recite the metal being coated as being “selected from the group consisting of hot rolled and pickled steel sheet, cold-rolled steel sheet, hot-dipped metallic coated steel sheets, electroplated metallic coated steel sheets, aluminum sheets, aluminum alloy sheets, zinc sheets, zinc alloy sheets, and gold.”

By contrast to the invention of independent claim 1, Scherer et al. teach that a copper single crystal can be protected from corrosion in an acidic media when the copper single crystal is coated with a thiol. Even adapting the Examiner’s statement of the teachings, Scherer et al. only teach coating copper for corrosion protection by immersion in a solution of 1-octanethiol or 1-hexadecanethiol in ethanol at 1mM concentration.

There is no teaching or suggestion of any applicability of the teachings of Scherer et al. beyond a copper single crystal. Applicants respectfully submit that these teachings of Scherer et al. are insufficient to anticipate claim 1 as amended herein. Withdrawal of the rejection of independent claim 1, and of claims 2 and 7-11 ultimately depending thereupon, is respectfully requested in view of the amendments herein. Claim 4 has been cancelled rendering the rejection thereof moot.

Rejections Under 35 USC §103

Claims 14 and 17 were rejected under 35 USC §103(a) as being obvious over JP 10-001786. As discussed at length above, JP 10-001786 fails to teach, or even suggest, all of the aspects of independent claim 13, upon which claim 14 ultimately depends. Particularly, JP 10-001786 teaches applying a chemical conversion coating to a galvanized steel sheet, and then treating the chemical conversion coating with a thiol compound to produce an overcoating including mercaptide compounds. There is no teaching or suggestion to treat the metal itself with a thiol compound, but rather only to treat the chemical conversion coating applied to the metal. Applicants respectfully submit that JP 10-001786 further fails to teach, or even suggest, a “method of providing corrosion protection for a galvanized steel by coating said steel with a thiol compound” and including “treating said galvanized steel with said solution or dispersion” in which the “galvanized steel is electro-galvanized” as recited by claim 14. Similarly, JP 10-001786 fails to teach, or even suggest, “coating galvanized and phosphated steel with a thiol compound” as required, in part, by claim 17. In view of the limited teachings of JP 10-001786, which only provide treating a chemical conversion coating with a thiol compound, Applicants respectfully request that the rejection of claims 14 and 17 under 35 USC §103(a) be withdrawn.

Claims 9 and 12 were rejected under 35 USC §103(a) as being obvious over JP 57-198269. As discussed above, JP 57-198269 is directed at protecting silver plated stainless steel against corrosion. Independent claim 1, upon which claims 9 and 12 ultimately depend, has been amended to recite the metal being coated as being “selected

from the group consisting of hot rolled and pickled steel sheet, cold-rolled steel sheet, hot-dipped metallic coated steel sheets, electroplated metallic coated steel sheets, aluminum sheets, aluminum alloy sheets, zinc sheets, zinc alloy sheets, and gold.” JP 57-198269 does not teach, or even suggest, the applicability of the disclosed method to metals other than specifically identified silver plated stainless steel. Applicants respectfully submit that amended independent claim 1, and therefore also claims 9 and 12, is not obvious over JP 57-198269. Withdrawal of this rejection is respectfully requested in view of the remarks and amendments herein.

Claims 3 and 12 were rejected under 35 USC §103(a) as being obvious over Scherer et al. The teachings of Scherer et al. are limited to the very narrow application of protecting a copper single crystal from corrosion in an acidic media when the copper single crystal is coated with a thiol. There is not teaching or suggestion of any applicability beyond the protection of a copper single crystal. Accordingly, Scherer et al. do not teach, or even suggest, a method of providing corrosion protection for a metal selected from the group consisting of hot rolled and pickled steel sheet, cold-rolled steel sheet, hot-dipped metallic coated steel sheets, electroplated metallic coated steel sheets, aluminum sheets, aluminum alloy sheets, zinc sheets, zinc alloy sheets, and gold, as recited by independent claim 1, upon which claims 3 and 12 ultimately depend. Accordingly, withdrawal of this rejection is respectfully requested in view of the remarks and amendments herein.

Having overcome all of the outstanding objections and rejection, the application is now believed to be in condition for allowance. An early allowance is respectfully requested.

In the event of any fee deficiencies, or that additional fees are payable, please charge our Deposit Account No. 50-2121 as necessary.

RESPECTFULLY SUBMITTED

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